CASA

MSc./BSc. Research Projects



Characterization of polymer raw materials used for the illegal manufacturing of 3D printed firearms

In recent years both internationally as here in the Netherlands there has been a growing concern on the illegal production and use of 3D printed firearms, i.e. firearms that fully or partly consist of synthetic polymer materials. Several incidents in the Netherlands have indicated that the production and use of such 'ghost guns' (guns that can not be traced on the basis of an officially registered serial numbers) is on the rise. This could significantly lower the barrier to obtain and use a firearm to commit violent crimes. In a response the Materials & Mictrotrace team of the Netherlands Forensic Institute (NFI) has built its knowledge base of 3D printed firearm production and has been working on new methods for forensic investigation of such items. Traditional firearms investigation revolves around engineering and the microscopic investigation of physical marks. However, 3D printed firearms create completely different traces and open up the forensic use of chemical analysis and polymer characterization techniques. For correct classification and forensic comparison, also knowledge on 3D printing and raw material sourcing needs to be developed. The NFI Materials & Mictrotrace experts team up with the UvA Analytical Chemistry group to start developing advanced polymer characterization methods for the forensic investigation of 3D printed firearms. We look for ambitious, talented students with a forensic chemistry or analytical chemistry background to work on the following projects.

1) Advanced LC and 2D-LC analysis of polymer raw materials for 3D printing:
   - Establishing and utilizing Molecular Weight Distributions using SEC
   - Additive analysis using HPLC/HILIC
   - Comprehensive 2D-LC characterization
   - Data analysis for classification using AI & multivariate analysis
   - Use of AI for method optimization

2) Thermal desorption headspace and Pyrolysis GC-MS analysis of polymer raw materials for 3D printing
   - Developing and optimizing an HS-GC-MS method for polymer RM analysis
   - Developing and optimizing a Py-GC-MS method for polymer RM analysis
   - Desiging an integrated method for combined HS and Py characterization
   - Data analysis for classification using AI & multivariate analysis
   - Use of AI for method optimization

Nederlands Forensisch Instituut
Ministerie van Justitie en Veiligheid

Contact

UvA HIMS AC
Name: Bob Pirok
E-mail:
b.w.j.pirok@uva.nl
Name: Arian van Asten
E-mail:
a.c.vanasten@uva.nl

NFI
Name: Martin Janssen
Name: Peter Zoon
Materials & Microtraces
Chemical & Physical
Traces

Location

UvA, Science Park 904
Atum 3D, Gouda

Time period

Start: Variable
Duration: Variable

Supervision

Daily supervisor:
Pascal Camoiras
Gonzalez (UvA)
Email:p.camoirasgonzale
z@uva.nl

First examiner:
Bob Pirok (UvA)
Second examiner:
Arian van Asten (UvA)


Ender
Ender
HG.22